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(56) Documents Cited

GB 1600197 A	GB 0911504 A	EP 0201817 A
US 4796508 A	US 3815892 A	US 2513027 A

(58) **Field of Search**
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INT CL⁶ B23Q , B25B , F16M
Online: EPODOC

(54) Abstract Title
Ball and socket mounting

(57) A tool includes a socket 131 to be secured to a support member by a clamp device 1, and a cap 15 detachably secured to the socket for securing a ball 14 between the socket and the cap. The ball includes an extension having a non-circular recess 143 formed in the upper portion. A tool member includes a stud 21 of non-circular cross-section engaged with the recess of the ball for preventing the tool member from rotating relative to the ball and for allowing the tool member to be solidly secured to the ball. The tool member may be a vice or a clamping device.

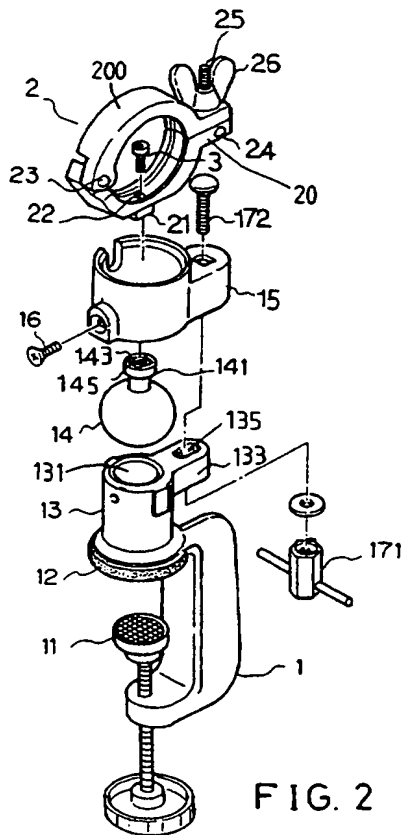


FIG. 2

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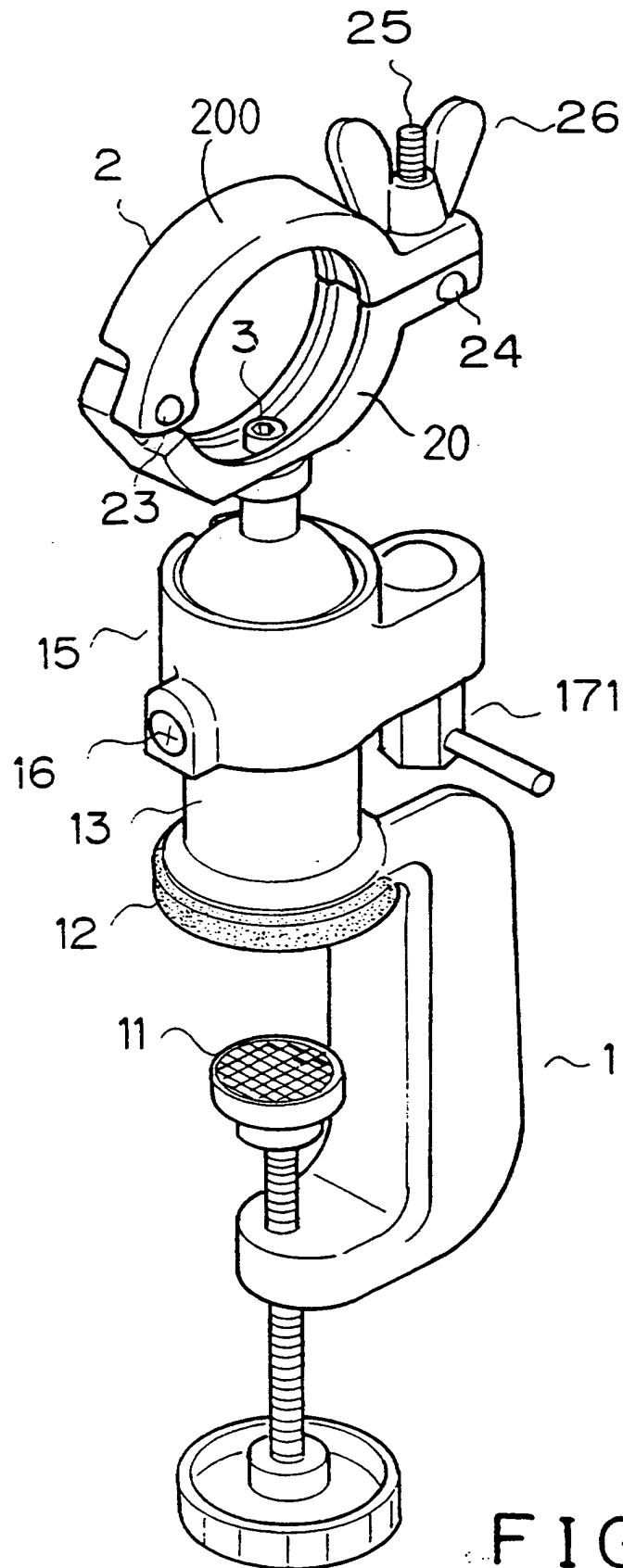


FIG. 1

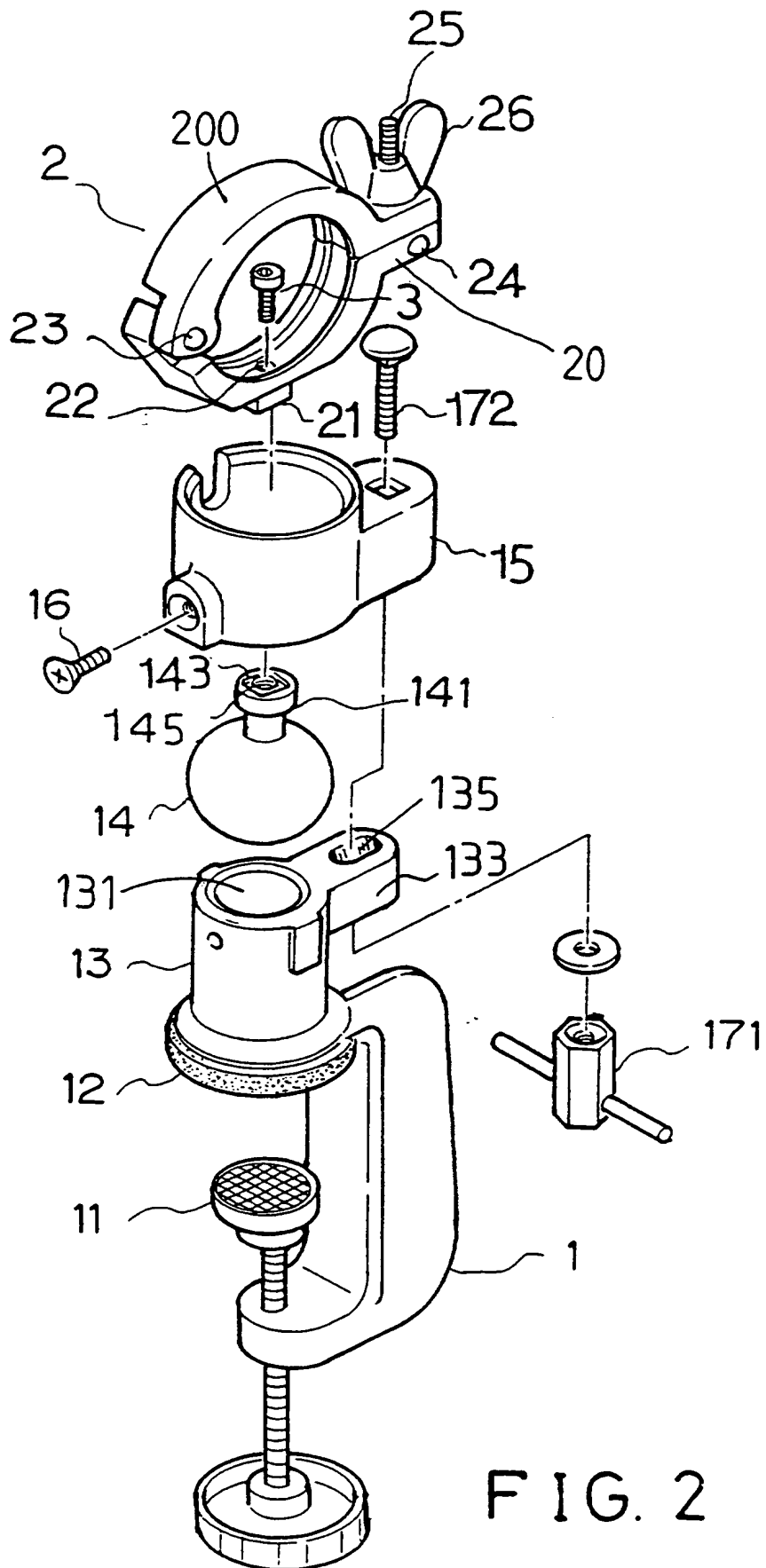


FIG. 2

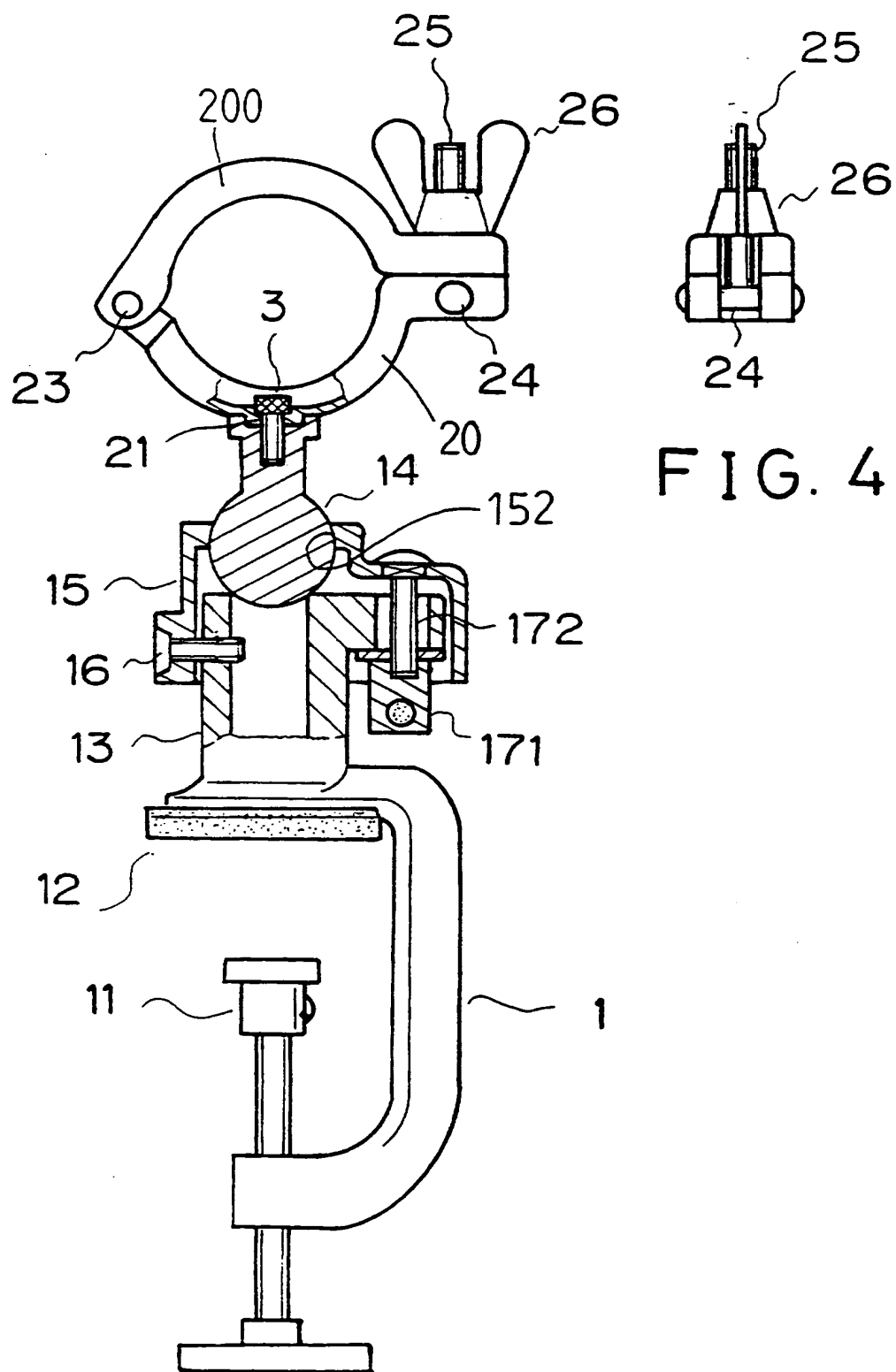
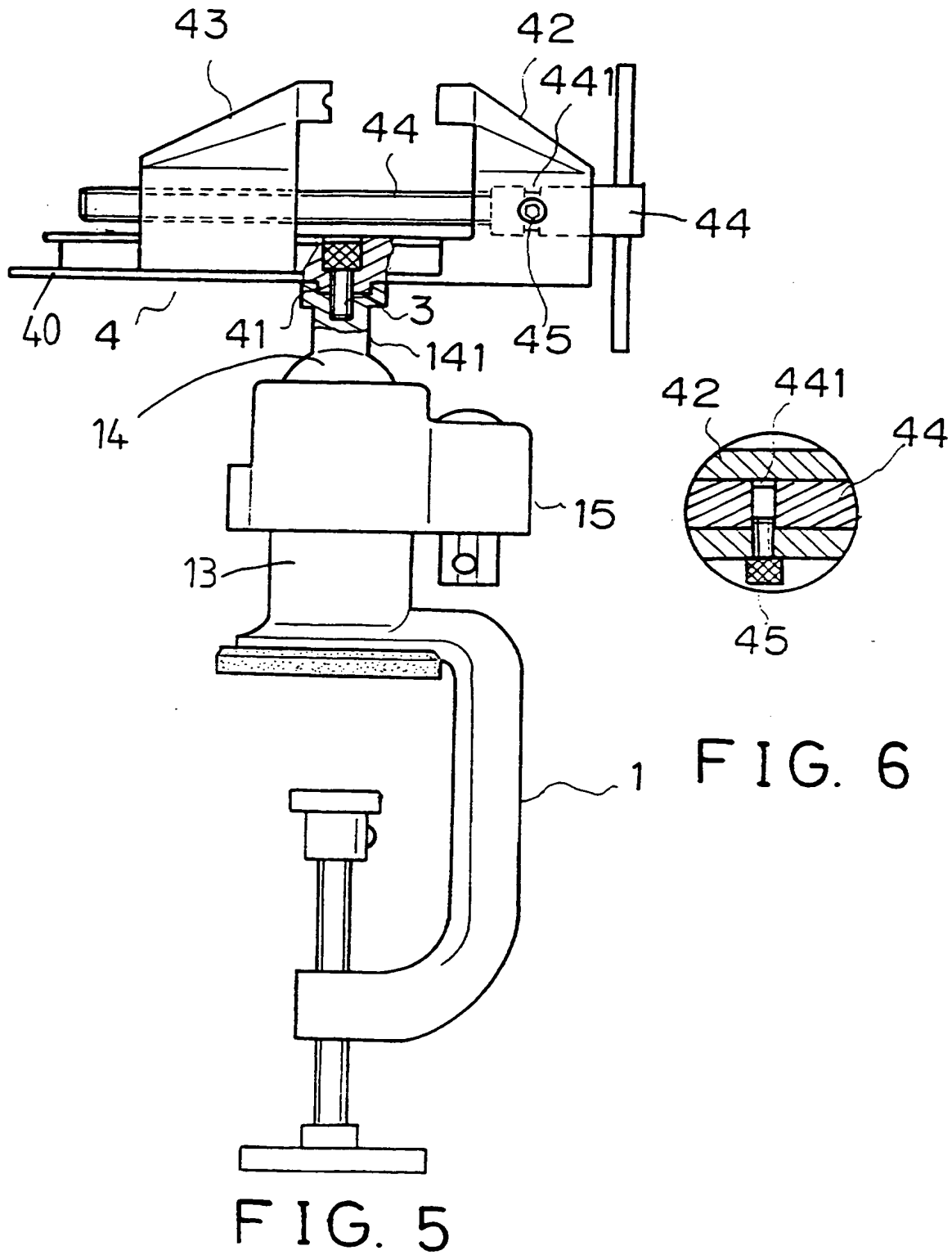


FIG. 3

FIG. 4



IMPROVEMENTS IN AND RELATING TO TOOLS

The present invention relates to a tool and more especially to a tool having an improved universal joint device.

Typical tools comprise a tool member secured to a support surface with a universal joint device which includes a ball secured to the tool member and a socket rotatably receiving the ball. However, the tool member may not be solidly secured to the ball and may be moved or rotated relative to the ball such that the tool member may not be easily operated.

It is accordingly an object of the present invention to provide a tool having a tool member that may be solidly secured to the ball of a universal joint device.

According to the present invention there is provided a tool comprising:-

- (a) a socket,
- (b) means for securing the socket to a support member,
- (c) a cap detachably secured to the socket,
- (d) a ball secured between the socket and the cap and including a non-circular recess formed therein,
- (d) a tool member including a stud of non-circular cross-section engaged with the recess of the ball for preventing the tool member from rotating relative to the ball, and
- (e) means for securing the tool member to the ball.

The cap may include a first end secured to the socket and a second end, and means for adjustably securing the second end of the cap to the socket. The socket may include an arm extending therefrom; the cap

adjustable securing means may include a fastener engaged through the second end of the cap and engaged with the arm of the socket for adjustably securing the second end of the cap to the socket.

The socket securing means may include a fixed jaw secured to the socket and a clamping member engaged with the fixed jaw for securing the socket to the support member.

The tool member may include a base having the stud extending therefrom, and a tool branch having a first end pivotally coupled to the base and having a second end detachably secured to the base.

The tool member may comprise a vice including a base having the stud extended therefrom for engaging with the recess of the ball.

The invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:-

Figure 1 is a perspective view of a tool in accordance with the present invention;

Figure 2 is an exploded view of the tool shown in Figure 1;

Figure 3 is a partial cross-sectional view of the illustrated tool;

Figure 4 is a side view of one end of the tool;

Figure 5 is a plan view of an alternative application of the tool member of the tool; and

Figure 6 is a partial cross-sectional view of the tool as shown in Figure 5.

Referring to the drawings, and initially to Figures 1 to 3, a tool comprises a clamp device 1 including a fixed jaw 12 and a clamping member 11 movable towards the fixed jaw 12 for clamping onto an object or a support member. The clamp device 1 includes a socket 13 having a cavity 131 formed therein for rotatably receiving a ball 14 and having an arm 133 extending therefrom. The arm is formed with an oblong hole 135 for receiving a fastener 172 therein. A nut, such as a wing nut 171, is engaged with the fastener 172 for securing purposes. The socket 13 may also be secured to other objects with a bolt, a hook-and-loop device or other fastener devices, without the clamp device 1. The ball 14 includes an extension 141 extending therefrom and having a non-circular recess 143 and a screw hole 145 formed in the free end portion thereof.

A cap 15 has a socket member 152 formed therein for engaging with the ball 14 and for retaining the ball 14 in place. The cap 15 has one end secured to the socket 13 with a fastener 16. The fastener 172 is engaged with the other end of the cap 15 for securing the cap 15 to the socket 13 and for adjustably securing the ball 14 between the socket 13 and the cap 15. When the nut 171 is unthreaded relative to the fastener 172, the ball 14 may be more easily rotated. On the contrary, when the nut 171 is further threaded relative to the fastener 172, the ball 14 may be solidly secured in place.

A tool member 2 includes a base 20 having a stud 21 of non-circular cross-section complementary to that of the non-circular recess 143 of the ball 14 and a screw hole 22 formed therein for engaging a fastener 3 for solidly securing the base 20 to the ball 14. Engagement of the stud 21 of the base 20 in the recess 143 of the ball 14 prevents the base 20 from rotating relative to the ball 14. The base 20 of the tool member 2 includes a pin 24 rotatably secured to one end thereof and having a fastener 25 extending therefrom. The tool member 2 includes a tool branch 200 having one end pivotally secured to the other end of the base 20 at a pivot 23 and

having its other end engaged with the fastener 25. A nut, such as a wing nut 26, is engaged with the fastener 25 (Figures 1 to 4) for securing the tool branch 200 to the base 20 and for holding an object or a work piece to be clamped in place.

As shown in Figures 5 and 6, the tool may comprise other tool member(s) 4, such as a vice, to be secured to the ball 14. The tool member 4 includes a base 40 having a stud 41 of non-circular cross-section corresponding to that of the non-circular recess 143 of the ball 14 for engaging with the recess 143 of the ball 14 and for preventing the base 40 of the tool member 4 from rotating relative to the ball 14. The tool member 4 includes a fixed jaw 42 having a bolt 44 rotatably received therein, and a movable jaw 43 engaged with the bolt 44 which may be used to move the movable jaw 43 toward and away from the fixed jaw 42 when the bolt 44 is rotated. The bolt 44 includes an annular groove 441 formed therein, and a fastener 45 is engaged into the fixed jaw 42 and engaged with the annular groove 441 of the bolt 44 (Figure 6) for rotatably securing the bolt 44 to the fixed jaw 42.

Accordingly, the tool includes one or more tool members 2, 4 having a stud of non-circular cross-section engaged with a non-circular recess of the ball 14 for solidly securing the tool members 2, 4 to the ball 14 and for preventing the tool members 2, 4 from rotating relative to the ball 14.

It will be appreciated that the foregoing is merely exemplary of tools in accordance with the invention and that various modifications can be made thereto without departing from the true scope of the invention.

CLAIMS

1. A tool comprising:
 - (a) a socket,
 - (b) means for securing the socket to a support member,
 - (c) a cap detachably secured to the socket,
 - (d) a ball secured between the socket and the cap and including a non-circular recess formed therein,
 - (e) a tool member including a stud of non-circular cross-section engaged with the recess of the ball for preventing the tool member from rotating relative to the ball, and
 - (f) means for securing the tool member to the ball.
2. A tool as claimed in claim 1, wherein the cap includes a first end secured to the socket and a second end, means being provided for adjustably securing the second end of the cap to the socket.
3. A tool as claimed in claim 1 or claim 2, wherein the socket includes an arm extending therefrom, the cap securing means including a fastener engaged through the second end of the cap and engaged with the arm of the socket for adjustably securing the second end of the cap to the socket.
4. A tool as claimed in any one of claims 1 to 3, wherein the socket securing means includes a fixed jaw secured to the socket and a clamping member engaged with the fixed jaw for securing the socket to the support member.
5. A tool as claimed in any one of the preceding claims, wherein the tool member includes a base having the stud extending therefrom, and a tool branch having a first end pivotally coupled to the base and a second end detachably secured to the base.

6. A tool as claimed in any one of the preceding claims, wherein the tool member is a vice including a base having the stud extended therefrom for engaging with the recess of the ball.
7. A tool substantially as herein described and as described with reference to the accompanying drawings.



Application No: GB 9901052.2
Claims searched: 1-7

Examiner: Dave Butters
Date of search: 15 November 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): B3B, B3C, B4W

Int CI (Ed.6): B25B, B23Q, F16M

Other: Online: EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 1600197 A (DALMAU)(whole document)	4
Y	GB 0911504 A (HORSTMANN)(see items 17 & 26)	5
X,Y	EP 0201817 A (REILING)(whole document)	X-1 Y-2-6
Y	US 4796508 A (HOSHINO)(" ")	2,3
Y	US 3815892 A (TULK)(" ")	6
Y	US 2513027 A (KRUCZEK)(figure 2)	2.3,6

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.